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Crum

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(54) **ZEROWALL MOTORIZED MULTI-POSITION RECLINER CHAIR MECHANISM**

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A47C 1/032	(2006.01)
A47C 7/40	(2006.01)
A47C 7/38	(2006.01)
A47C 3/025	(2006.01)
A47C 1/035	(2006.01)
A47C 7/50	(2006.01)

(52) **U.S. Cl.**

CPC ***A47C 1/0342*** (2013.01); *A47C 1/035* (2013.01); *A47C 1/03211* (2013.01); *A47C 3/0255* (2013.01); *A47C 7/38* (2013.01); *A47C 7/40* (2013.01); *A47C 7/506* (2013.01)

(58) **Field of Classification Search**

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USPC ..... 297/68, 342, 463.1, 354.12, 85 M, 85 R, 297/84

See application file for complete search history.

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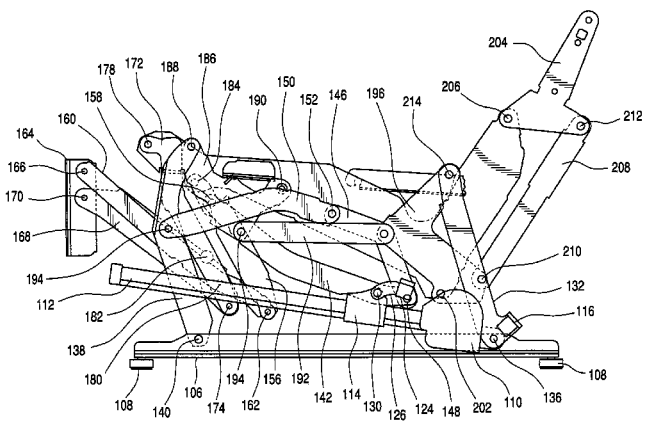
(57) **ABSTRACT**

A zerowall motorized multi-position recliner chair mechanism is disclosed wherein, in accordance with a first embodiment, the chair seat rails are stably supported by means of a pair of oppositely disposed support linkage systems connected to the chair base rails. In addition, the rear sections of the pair of oppositely disposed support linkage systems are pivotally connected to the base rails at first pivot points, while the drive motor is pivotally mounted upon an integral structural unit so as to permit the drive motor to pivot around a second pivot point which is coaxially disposed with respect to the first pivot point. In this manner, the drive motor is substantially fixed, or at least positionally constrained, at a predetermined position with respect to the base rails, thereby providing additional stability to the chair. In accordance with a second embodiment, the drive motor is attached directly to the rear base rail.

20 Claims, 5 Drawing Sheets



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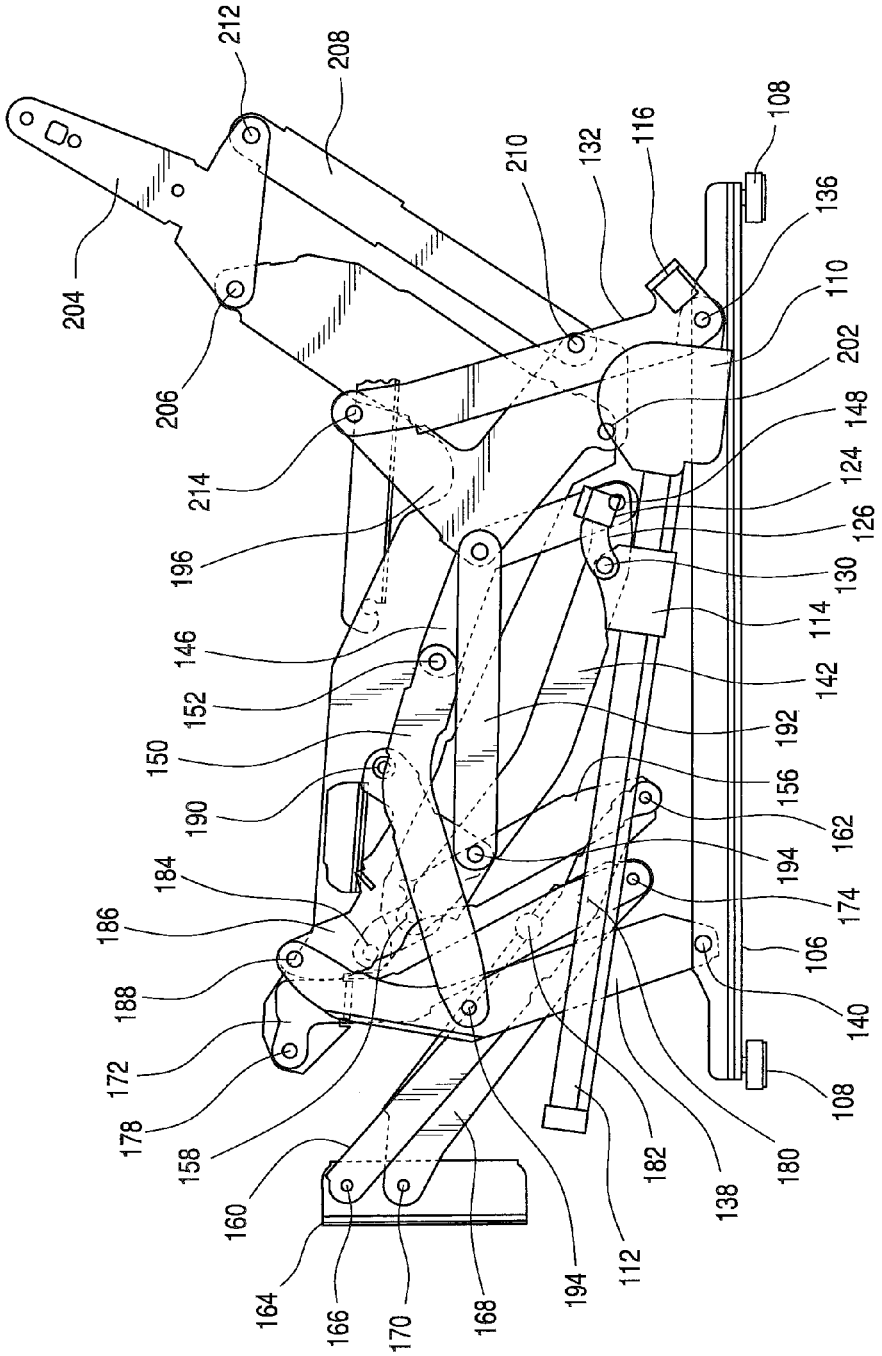
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FIG. 1

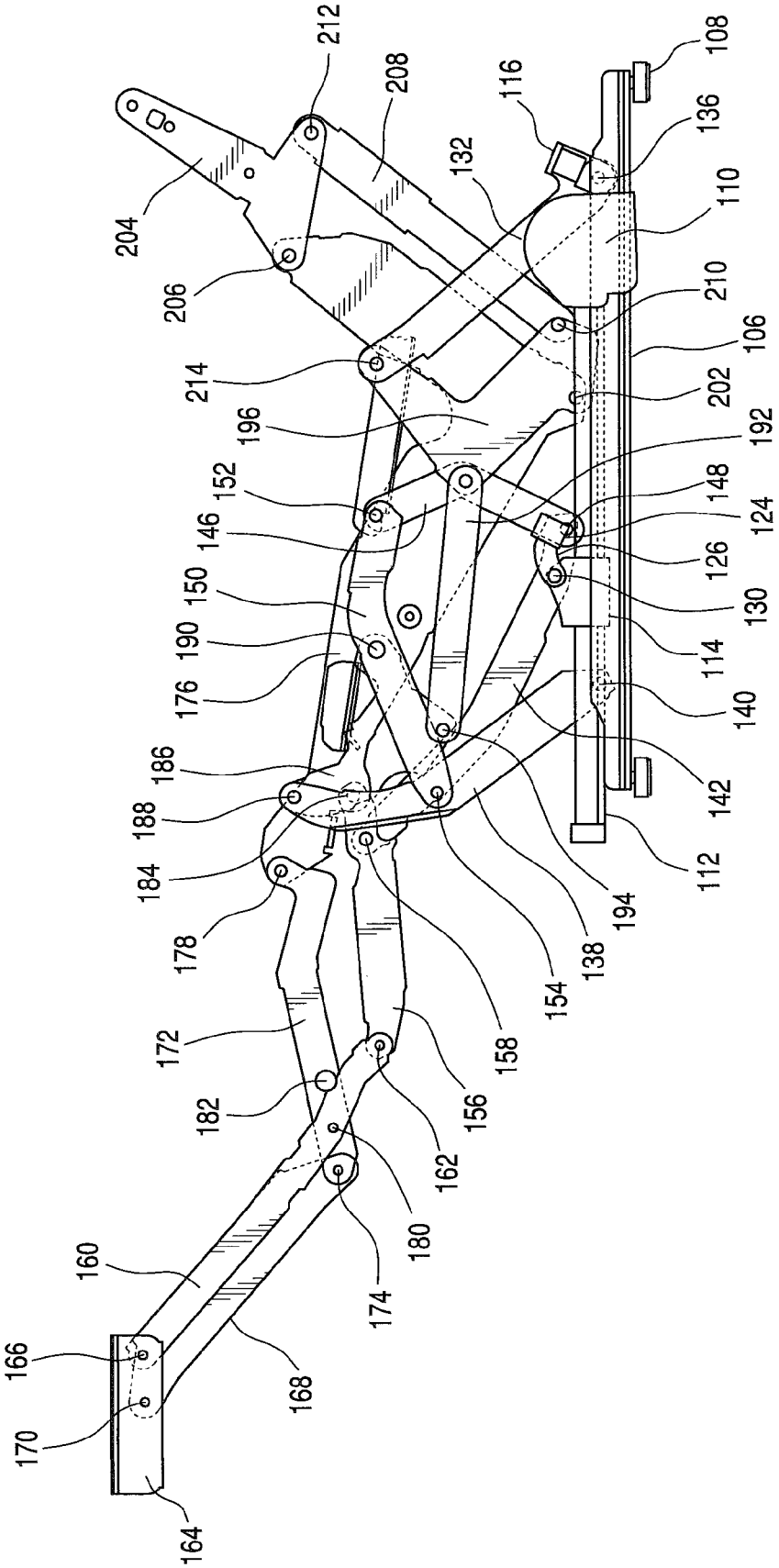
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FIG. 2

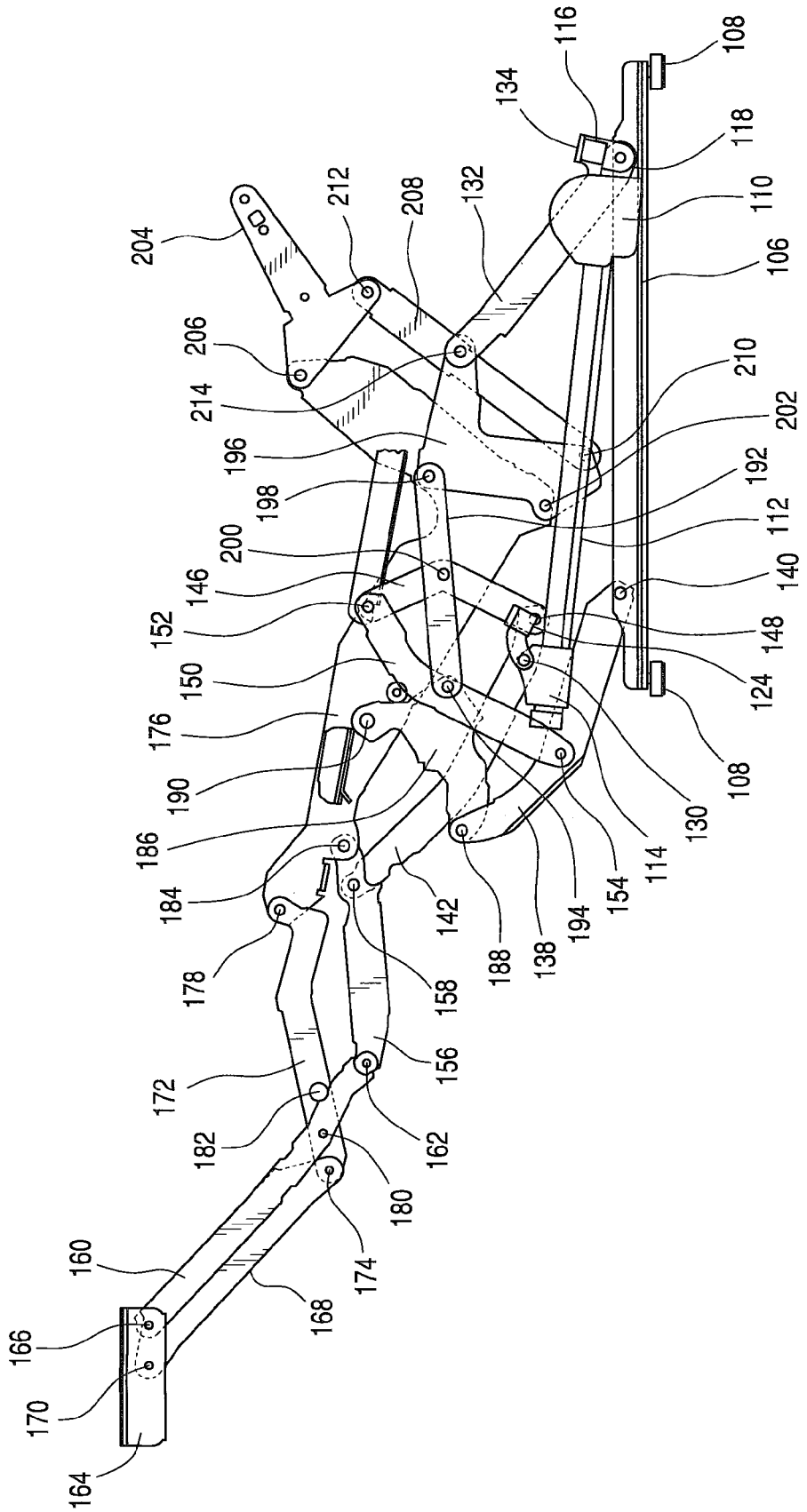
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FIG. 3

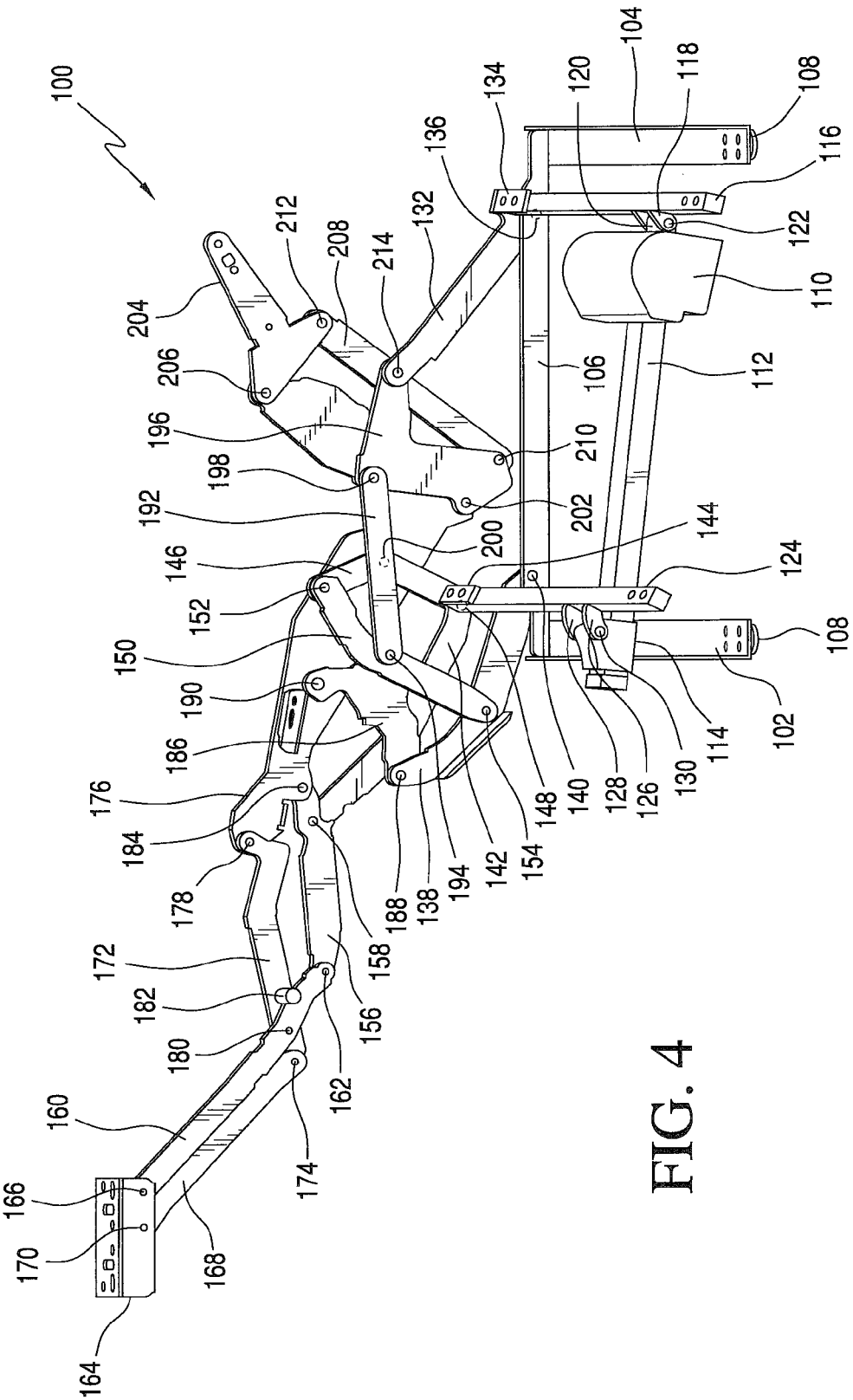
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FIG. 4

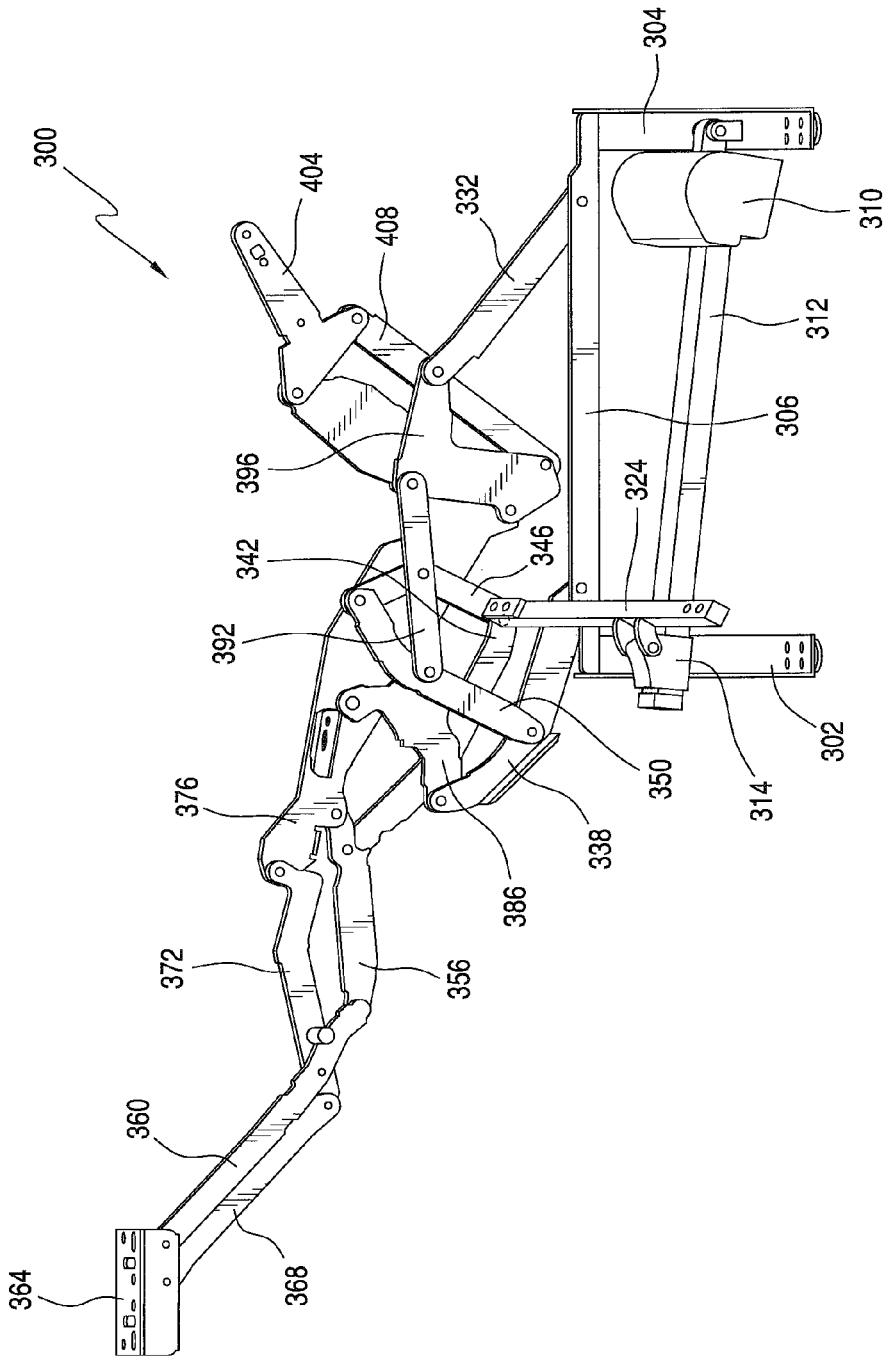
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FIG. 5

ZEROWALL MOTORIZED MULTI-POSITION RECLINER CHAIR MECHANISM

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

NAMES OF PARTIES TO JOINT RESEARCH AGREEMENT

Not Applicable

INCORPORATION BY REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

Not Applicable

FIELD OF THE INVENTION

The present invention relates generally to multi-position recliner chairs, and more particularly to a motorized multi-position recliner chair mechanism wherein when the chair is moved from its original closed or upright position to a fully open reclined position, the entire body of the chair is moved forwardly such that the chair can be disposed close to a wall with minimum spacing required to be defined therebetween.

BACKGROUND OF THE INVENTION

Furniture conventionally known as "zerowall" furniture are those artides of furniture, such as, for example, recliner chairs, wherein the rear portion of the chair can be disposed close to a wall of a room such that when the chair is to be moved from its original or normal closed or upright position, to its fully open reclined position, the entire body of the chair is moved forwardly so as to permit the seat back and the headrest portion of the chair to be inclined without coming into contact with, and thereby being obstructed in their movements from their original or normal closed or upright positions to their fully open reclined positions, by the wall. Earlier zerowall chairs were manually operated, however, motorized zerowall chairs were soon developed after the initial appearance of the manually operated chairs. Nevertheless, such motorized zerowall chairs encountered operational difficulties wherein, for example, substantially large forces, stresses, and torques were effectively impressed upon the drive motor components. In addition, the drive motors effectively moved significantly relative to the base rails, supporting the chairs upon the ground or other support surfaces, such that when the chairs were moved from their original or normal, closed or upright positions to their fully open reclined positions, the chairs did not comprise properly stabilized structures due to the aforenoted significant movements of the drive motors relative to the base rails. Still further, the drive systems, defined between the drive motor and the components of the chair that had to be moved in order to facilitate the movement of the chairs from their original or normal closed or upright positions to their fully open reclined positions, comprised relatively complex linkage arrangements.

A need therefore exists in the art for a new and improved zerowall motorized multi-position recliner chair mechanism wherein the disposition and connection of the drive motor relative to the base rails as well as to the actuating linkage components is such that substantially large forces, stresses, and torques are effectively eliminated from being impressed upon the drive motor components. A need also exists in the art for a new and improved zerowall motorized multi-position recliner chair mechanism such that the drive motor is effectively substantially positionally fixed pr constrained relative to the base rails, which support the chair upon the ground or other support surface, whereby when the chair is moved from its original or normal, closed or upright position to its fully open reclined position, the chair comprises a properly stabilized structure due to the substantially positionally fixed or constrained disposition of the drive motor relative to the base rails. Still further, a need exists in the art for a new and improved zerowall motorized multi-position recliner chair mechanism which comprises a relatively simplified linkage system that is defined between the drive motor and the components of the chair that need to be moved in order to facilitate the movement of the chair from its original or normal, closed or upright position to its fully open reclined position.

SUMMARY OF THE INVENTION

The foregoing and other objectives are achieved in accordance with the teachings and principles of the present invention through the provision of a new and improved zerowall motorized multi-position recliner chair mechanism wherein, in accordance with a first embodiment, the chair seat rails are stably supported by means of a pair of oppositely disposed support linkage systems connected to the chair base rails. In addition, the rear sections of the pair of oppositely disposed support linkage systems are pivotally connected to the base rails at first pivot points, while the drive motor is pivotally mounted upon an integral structural unit so as to permit the drive motor to pivot around a second pivot point which is coaxially disposed with respect to the first pivot point. In this manner, the drive motor is substantially fixed, or at least positionally constrained, at a predetermined position with respect to the base rails, thereby providing additional stability to the chair. In accordance with a second embodiment of the chair, the drive motor is attached directly to the rear base rail.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other features and attendant advantages of the present invention will be more fully appreciated from the following detailed description when considered in connection with the accompanying drawings in which like reference characters designate like or corresponding parts throughout the several views, and wherein:

FIG. **1** is a schematic side elevational view of the right side half of a first embodiment of a new and improved zerowall motorized multi-position recliner chair mechanism as developed in accordance with the principles and teachings of the present invention wherein the chair is disposed at its normally closed, original, upright position;

FIG. **2** is a schematic side elevational view, similar to that of FIGURE **1**, showing, however, the zerowall motorized multi-position recliner chair wherein the chair is disposed at a partially open position at which, for example, the footrest has been moved to an extended position, however, the backrest is still disposed in an upright position;

FIG. **3** is a schematic side elevational view, similar to that of FIGS. **1** and **2**, showing, however, the zerowall motorized multi-position recliner chair wherein the chair is disposed at a completely open position at which the footrest has been

moved to an extended position and the backrest has been disposed at a reclined position;

FIG. **4** is a perspective elevational view similar to that of FIG. **3** showing the various components of the zerowall motorized multi-position recliner chair at their respective positions as illustrated within FIG. **3**; and

FIG. **5** is a perspective elevational view similar to that of FIG. **4** showing the various components of a second embodiment of the zerowall motorized multi-position recliner chair with the various components disposed at their respective positions as illustrated within FIG. **4**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and more particularly to FIGS. **1-4** thereof, a new and improved zerowall motorized multi-position recliner chair mechanism is disclosed and is generally indicated by the reference character **100**. As was noted in the BRIEF DESCRIPTION OF THE DRAWINGS, FIG. **4** is a perspective view of only, for example, the right half side of the chair mechanism **100**, it therefore being understood and noted further that an opposite mirror image of the chair mechanism components illustrated within FIG. **4** would comprise the left half side of the chair mechanism **100** so as to in fact comprise the entire operative chair mechanism **100**. As can be best seen from FIG. **4**, the new and improved zerowall motorized multi-position recliner chair mechanism **100** is seen to comprise four base rails, only three of which are illustrated at **102**,**104**,**106**, wherein the four base rails **102** are disposed within a substantially rectangular array and are stably supported upon a ground or floor surface, not shown, by means of downwardly projecting feet or leg members **108**. For convenience, the three visible base rails **102**,**104**,**106** will be referred to hereinafter as the forward base rail member **102**, the rearward base rail member **104**, and the right side base rail member **106**. In addition, it is further seen that the chair mechanism **100** comprises a drive motor **110** which has a drive or linear motor actuator **112** operatively associated therewith. The drive or linear motor actuator **112** can comprise a cylindrical screw having rotary threads formed thereon so as to operatively cooperate and drive an actuator drive block **114** forwardly and rearwardly along the actuator **112** as the drive motor **110** rotates the drive motor actuator **112**, the actuator drive block **114** of course having cooperating threads disposed internally thereof. Other linear actuators, such as, for example, the linear actuator disclosed within U.S. Pat. No. 8,398,165 which issued to Lawson on Mar. 19, 2013, as well as the linear actuator disclosed within U.S. Pat. No. 8,573,687 which issued to Lawson et al. on Nov. 5, 2013, can likewise be utilized. It is further seen that the drive motor **110** is pivotally mounted upon, and connected to, a transversely oriented rear motor mounting tube **116** by means of a clevis-type rear motor mounting bracket **118**, wherein a lug **120** projects outwardly from the drive motor **110** and is pivotally connected to the mounting bracket **118** by means of a pivot pin connection **122**. In a similar manner, it is likewise seen that the actuator drive block **114** is pivotally mounted upon, and connected to, a transversely oriented front actuator drive block mounting tube **124** by means of a clevis-type front actuator drive block mounting bracket **126**, wherein a lug **128** projects outwardly from an upper surface portion of the actuator drive block **114** and is pivotally connected to the mounting bracket **126** by means of a pivot pin connection **130**.

With reference continuing to be made to FIG. **4**, it is further seen that the right end portion of the transversely oriented rear motor mounting tube **116** is fixedly connected to a right rear support link **132** by means of a corner mounting bracket **134**, it of course being appreciated and understood that the left end, not illustrated, of the rear mount tube **116** is likewise fixedly connected to a corresponding, oppositely disposed rear support link, also not illustrated. In this manner, a first integrally fixed unit is effectively formed by means of the rear motor mounting bracket **118**, the rear motor mount tube **116**, and the right rear support link **132**. The right rear support link **132** is, in turn, pivotally connected at the lower end portion thereof to the right side base rail member **106** by means of a pivot pin **136**, which can best be seen in FIGS. **1-3**, and it is to be understood and appreciated further that the pivot pins **122** and **136** are coaxially disposed with respect to each other. In this manner, or as a result of this construction of this portion of the chair mechanism **100**, it can be appreciated that the drive motor **110** is effectively positionally fixed, or at least positionally constrained, with respect to the base rail assembly comprising the base rail members **102**,**104**,**106**, such that the drive motor **110** does not undergo any significant positional movement relative to the base rail assembly other than some pivotal movement as permitted by means of the pivot pin assembly **118**,**120**,**122** as will be necessary when the various components of the chair mechanism linkage system are actuated, as will be more fully explained hereinafter. Furthermore, this structural relationship prevents any asymmetrical moments from being developed when the drive motor **110** undergoes any pivotal movements whereby, otherwise, such asymmetrical moments would act upon or be transferred to the various linkage components and the base rails **102**,**104**,**106** possibly rendering the chair mechanism **100** unstable. Accordingly, this positional constraint and limited movement of the drive motor **110** with respect to the base assembly provides enhanced stability for the recliner chair.

In a similar manner, and as will also be more fully discussed hereinafter, chair mechanism **100** likewise comprises a right front support link **138** wherein the lower end portion of the right front support link **138** is pivotally connected to the right side base rail member **106** by means of a pivot pin **140** which can best be seen in FIGS. **1-3**. Still yet further, and in a manner similar to the fixed connection that was defined between the rear support link **132** and the rear motor mounting tube **116** by means of the corner bracket **134**, it is likewise seen that the lower end portion of a first drive control link **142** is fixedly connected to the right end portion of the front actuator drive block mounting tube **124** by means of a corner mounting bracket **144**. In this manner, a second integrally fixed unit is effectively formed by means of the front actuator drive block mounting bracket **126**, the front actuator drive block mounting tube **116**, and the right rear support link **132**. In addition, it is also seen that the lower end portion of a pivot link **146** is pivotally connected to the lower end portion of the first drive control link **142** by means of a pivot pin **148** which can best be seen in FIGS. **1-3**. In turn, the upper end portion of the pivot link **146** is pivotally connected to a first end portion of a second drive control link **150** by means of a pivot pin **152**, while a second opposite end portion of the second drive control link **150** is pivotally connected to an intermediate section of the right side front support link **138** by means of a pivot pin **154**.

It will also be seen that the upper end portion of the drive control link **142** is pivotally connected to an inter-mediate portion of a first footrest actuating link **156** by means of a

pivot pin **158**, while a first end portion of the first footrest actuating link **156** is pivotally connected to a first end portion of a second footrest actuating link **160** by means of a pivot pin **162**. The second opposite end portion of the second footrest actuating link **160** is pivotally connected to a rear portion of a footrest mounting bracket **164** by means of a pivot pin **166**, while it is additionally seen that a first end portion of a third footrest actuating link **168** is pivotally attached to an intermediate portion of the footrest mounting bracket **164** by means of a pivot pin **170**. The second opposite end portion of the third footrest actuating link **168** is seen to be pivotally connected to a first end portion of a fourth footrest actuating link **172** by means of a pivot pin **174**, and the second opposite end portion of the fourth footrest actuating link **172** is pivotally connected to a right side seat rail **176** by means of a pivot pin **178**. It is also noted that an intermediate portion of the fourth footrest actuating link **172** is pivotally connected to an intermediate portion of the second footrest actuating link **160** by means of a pivot pin **180**, for a purpose that will be discussed more fully hereinafter, and it is also seen that the fourth footrest actuating link **172** is also provided with a contact stop **182** for a purpose which will likewise be discussed more fully hereinafter. Lastly, with respect to the footrest actuating links **156**,**160**,**168**, and **172**, it is seen that a second opposite end portion of the first footrest actuating link **156** is pivotally connected to the right side seat rail **176** by means of a pivot pin **184**.

Continuing further, it is seen that the upper end portion of the right side front support link **138** is pivotally connected to a first corner region of a substantially triangular-shaped recline control link **186** by means of a first pivot pin **188**, while a second corner region of the recline control link **186** is pivotally connected to the seat rail **176** by means of a second pivot pin **190**. Still yet further, a third corner region of the recline control link **186** is pivotally connected to a first end portion of a recline connector link **192** by means of a third pivot pin **194**, while a second opposite end portion of the recline connector link **192** is pivotally connected to a first region of a recline pivot link **196**, which has a substantially inverted L-shaped configuration, by means of a first pivot pin **198**. Within this region of the mechanism linkage system, it can also be seen that an intermediate portion of pivot link **146** is pivotally connected to a substantially central portion of the seat rail **176** by means of a pivot pin **200** which can best be seen in FIG. **3**. Reverting back to the substantially inverted L-shaped recline pivot link **196**, it is further seen that a first lower portion of the recline pivot link **196** is pivotally connected to a lower portion of the seat rail **176** by means of a second pivot pin **202**, while an upper rear portion of the seat rail **176** has a first corner portion of a seatback support or mounting bracket **204** pivotally mounted thereon by means of a pivot pin **206**. A second lower portion of the recline pivot link **196** has a first lower end portion of a backrest recline link **208** pivotally connected thereto by means of a third pivot pin **210**, while the second opposite upper end portion of the seatback recline link **208** is pivotally connected to the seatback support or mounting bracket **204** by means of a pivot pin **212**. It is lastly seen that an upper end portion of the right rear support link **132** is pivotally connected to the outwardly projecting portion of the substantially inverted L-shaped recline pivot link **196** by means of a fourth pivot pin **214**.

Having now described substantially all of the operating components defining the recliner chair mechanism **100**, a brief operation of the same, for quickly and smoothly moving the various components comprising the recliner chair, such as, for example, the footrest mounting bracket **164**, upon which a chair footrest, not shown, will be mounted, as well as the backrest support or mounting bracket **204**, upon which a chair backrest, also not shown, will likewise be mounted, between their CLOSED or retracted positions to their fully OPEN or extended positions, will now be described. It will be seen that the linkage system of the present invention mechanism will, in effect, comprise a first linkage system which moves the footrest from a CLOSED position to an OPEN position as a result of the linear movement of the actuator drive block from its original START position to a first predetermined position along the drive motor actuator, and a second linkage system which moves the seatback from an upright position to an inclined position as a result of the linear movement of the actuator drive block still further along the drive motor actuator from the first predetermined position to the second predetermined position. More particularly, with reference being made to FIG. **1**, the new and improved zerowall motorized multi-position recliner chair mechanism **100** is disclosed at its retracted or CLOSED position at which it can be seen that the drive motor **110** has been actuated such that the actuator drive block **114** is disposed at its rearward-most position. Accordingly, the footrest mounting bracket **164** is disposed at its CLOSED position at which a footrest, not shown, mounted upon the footrest mounting bracket **164**, will be disposed at its CLOSED position at which the footrest will be disposed in a vertically downward orientation, while the backrest support or mounting bracket **204** will be disposed at its upright position. When it is desired to initially move the chair from its original, normally CLOSED position to, for example, a TV position at which the footrest is moved from its vertically downward position to an elevated position as disclosed within FIG. **2**, the motor drive **106** is actuated so as to move the actuator drive block **114** forwardly with respect to the drive motor actuator **112** to, for example, the disposition of the actuator drive block **114** as illustrated within FIG. **2**. Accordingly, it can be seen that as the actuator drive block **114** moves forwardly along the drive motor actuator **112**, the first drive control link **142** is correspondingly moved forwardly as a result of the first fixed integral unit defined by or between the actuator drive block **114**, the actuator drive block lug **128**, the front motor mounting bracket **126**, the front actuator drive block mounting tube **124**, and the first drive control link **142** fixedly secured to the front actuator drive block mounting tube **124** by means of the corner bracket **144**. Still further, appreciating the fact that the forward end portion of first drive control link **142** is pivotally connected to the first footrest actuating link **156**, the first footrest actuating link **156** will move in a clockwise direction from its position illustrated within FIG. **1** to its position illustrated within FIG. **2** as a result of pivotal movement around pivot pin **184** which pivotally secures the first drive control link **142** to the seat rail **176**. In turn, the second footrest actuating link **160** is moved forwardly or extended from its position illustrated within FIG. **1** to its position illustrated within FIG. **2** as a result of its pivotal connection, at its first end portion, to the first footrest actuating link **156** by means of pivot pin **162**.

Recalling that the second opposite end portion of the second footrest actuating link **160** is pivotally connected to the footrest mounting bracket **164** by means of pivot pin **166**, the footrest mounting bracket **164** is moved toward its forward-most elevated and horizontally oriented disposition as a result of the pivotal connection defined between the footrest mounting bracket **164** and the third footrest actuating link **168**. It will also be recalled that an intermediate

portion of the second footrest actuating link **160** is pivotally connected to the fourth footrest actuating link **172** which is not only pivotally connected at one end portion thereof to the seat rail **176** by means of pivot pin **178**, but the fourth footrest actuating link **172** is also pivotally attached at its opposite end portion to the third footrest actuating link **168** by means of pivot pin **174**. Accordingly, as the fourth footrest actuating link **172** is moved forwardly as a result of the forward movement of the second footrest actuating link **160**, the fourth footrest actuating link **172** will effectively cause the third footrest actuating link **168** to move upwardly, thereby moving the footrest support bracket **164** to a horizontal orientation and to a predetermined elevational position relative to the base rails **102**,**104**,**106**. This orientation is also effectively predetermined as a result of the predetermined spacing defined between the pivot pins **166** and **170**. Still yet further, this actuating movement of the various linkage components continues until the stop member **182**, disposed upon the fourth footrest actuating link **174**, encounters the second footrest actuating link **160**. As the footrest support bracket **164** is moving forwardly relative to the base rails **102**,**104**, **106** by means of the aforenoted linkage connections, the seat rail **176** is also being moved forwardly so as to achieve the desired zerowall functional operation of the recliner chair.

More particularly, it will be recalled that the pivot link **146** is pivotally connected to the first drive control link **142** by means of the pivot pin **148** which can best be seen in FIG. **1**. In addition, it will also be recalled that the pivot link **146** is pivot-ally connected to the seat rail **176** by means of the pivot pin **200**. Accordingly, as the first drive control link **142** is moved forwardly, the seat rail **176** will be moved forwardly as a result of its pivotal connection to the pivot link **146** which, in turn, is pivotally connected at its lower end portion to the first control drive link **142** as at **148**, however, the pivot link **146** will also pivot or rotate in the clockwise direction around pivot pin **200**, pivotally connecting the pivot link **146** to the seat rail **176**, causing the second control drive link **150** to rotate in a clockwise direction. Since the upper end portion of the pivot link **146** is also pivotally connected to one end portion of the second drive control link **150** by means of pivot pin **152**, while the second opposite end portion of the second drive control link **150** is pivotally connected to an intermediate portion of the right side front support link **138** by means of pivot pin **154**, it can therefore be appreciated that the right side front support link **150** effectively moves in a counterclockwise direction with respect to the base rails **102**,**104**,**106**. It is to be noted that the chair mechanism **100** is supported by means of the front support links **138**, only the right side front support link **138** being illustrated, as well as by means of the rear support links **132**, only the right side rear support link **132** being illustrated.

When the recliner chair is moved from the TV position illustrated within FIG. **2**, to the fully reclined position illustrated within FIG. **3**, and therefore with reference now being made to FIG. **3**, it is noted that the actuator drive block **114** has now been moved to its forwardmost position. Accordingly, the right side support link **138** has been rotated still further in the counterclockwise direction, and therefore it is seen that such rotation of the right side support link **138** causes the counterclockwise rotation of the recline control link **186** relative to the seat rail **176** as a result of the pivotal connection of the recline control link **186** to the seat rail **176** by means of the pivot pin **190**. It will be recalled that one end portion, that is, the left end portion, of the recline connector link **192** is pivotally connected to the recline control link **186**, while the opposite or right end portion of the recline connector link **192** is pivotally connected to the recline pivot link **196**. Therefore, as the recline control link **186** rotates or pivots in a counterclockwise direction, the recline connector link **192** will effectively be moved toward the right or rearwardly. Such rightward or rearward movement of the recline connector link **192** will, in turn, cause clockwise rotation of the recline pivot link **196** around pivot pin **202** that pivotally connects the recline pivot link **196** to the seat rail **176**. Rotational movement of the recline pivot link **196**, in turn, results in the downward movement of the backrest recline link **208** as a result of the pivotal connection of the lower end portion of the backrest recline link **208** to the recline pivot link **196** by means of pivot pin **210**. The downward movement of the backrest recline link **208** therefore causes the seatback support or mounting bracket **204** to be rotated in a clockwise direction relative to the seat rail **176**, around pivot pin **206**, as a result of the pivotal connection defined between the seatback recline link **208** and the seatback support or mounting bracket **204** by means of pivot pin **212**. It is to be lastly understood that the driving of drive motor **110** in a reverse mode will effectively reverse all of the aforenoted movements of the various mechanism linkages such that the chair mechanism **100** can be moved and returned from its fully recline position, illustrated within FIGS. **3** and **4**, to the intermediate and original positions respectively illustrated within FIGS. **2** and **1**.

Lastly, with reference now being made to FIG. **5**, a second embodiment of a new and improved zerowall motorized multi-position recliner chair mechanism is disclosed and is generally indicated by the reference character **300**. It is to be noted that component parts of the second embodiment chair mechanism illustrated within FIG. **5**, that correspond to component parts of the first embodiment chair mechanism illustrated within FIG. **1**, will be denoted by similar reference characters except that such reference characters will be in the **300** and **400** series. In addition, for brevity purposes, a description of those structural components which are common to both embodiments, and which are operationally similar, will not be discussed in detail, the description of the second embodiment illustrated within FIG. **5** being limited to the structural differences between the first and second embodiments. More particularly, it can readily be seen that the primary difference of the chair mechanism **300** as illustrated within FIG. **5**, when compared to the chair mechanism **100** disclosed within FIGS. **1**-**4**, resides in the fact that the rear motor mounting tube has effectively been eliminated. As a result of this structural change, it is seen that in lieu of the drive motor **310** of the chair mechanism **300** being mounted upon the rear motor mounting tube, the drive motor **310** is pivotally attached directly to the rear base or floor rail **304**. In addition, it is likewise seen that the right rear support link **332** is likewise connected directly to the right base rail **306**.

Thus, it may be seen that, in accordance with the teachings and principles of the present invention, there has been disclosed a zerowall motorized multi-position recliner chair mechanism wherein, in a first embodiment, the chair seat rails are stably supported by means of a pair of oppositely disposed support linkage systems connected to the chair base rails. In addition, the rear sections of the pair of oppositely disposed support linkage systems are pivotally connected to the base rails at first pivot points, while the drive motor is pivotally mounted upon an integral structural unit so as to permit the drive motor to pivot around a second pivot point which is coaxially disposed with respect to the first pivot point. In this manner, the drive motor is substan-

tially fixed, or at least positionally constrained, at a predetermined position with respect to the base rails, thereby providing additional stability to the chair. In accordance with a second embodiment, the drive motor is attached directly to the rear base rail.

Obviously, many variations and modifications of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the present invention may be practiced otherwise than as specifically described herein.

NUMBER KEY GUIDE TO COMPONENT PARTS

100—chair mechanism
102—front base rail member
104—rear base rail member
106—right side base rail member
108—feet/legs
110—drive motor
112—drive motor actuator
114—actuator drive block
116—rear motor mounting tube
118—rear motor mounting bracket
120—lug of drive motor
122—pivot pin pivotally connecting **120** to **118**
124—front actuator drive block mounting tube
126—front motor mounting bracket
128—lug of actuator drive block
130—pivot pin connection between lug **128** and bracket **126**
132—right rear support link
134—corner mounting bracket connecting **132** to **116**
136—pivot pin connecting **132** to right side base rail **106**
138—right side front support link
140—pivot pin connecting lower end portion of **138** to right side base rail **106**
142—first drive control link
144—corner mounting bracket connecting **142** to **124**
146—pivot link
148—pivot pin connecting **146** to **142**
150—second drive control link
152—pivot pin connecting **150** to **146**
154—pivot pin connecting **150** to **138**
156—first footrest actuating link
158—pivot pin connecting **142** to **156**
160—second footrest actuating link
162—pivot pin connecting **156** to **160**
164—footrest mounting bracket
166—pivot pin connecting **160** to **164**
168—third footrest actuating link
170—pivot pin connecting **168** to **164**
172—fourth footrest actuating link
174—pivot pin connecting
176—seat rail
178—pivot pin connecting **172** to **176**
180—pivot pin interconnecting midpoints of **160** and **172**
182—contact stop on **172**
184—pivot pin connecting **156** to seat rail **176**
186—recline control link
188—pivot pin connecting first corner region of **186** to **138**
190—pivot pin connecting second corner region of **186** to **176**
192—recline connector link
194—pivot pin connecting **192** to **186**
196—recline pivot link
198—pivot pin connecting **192** to **196**
200—pivot pin connecting **146** to **176**
202—pivot pin connecting **196** to **176**
204—seatback support or mounting bracket
206—pivot pin connecting **204** to **176**
208—seatback recline link
210—pivot pin connecting **196** to **208**
212—pivot pin connecting **208** to **204**
214—pivot pin connecting **132** to **196**

What is claimed as new and desired to be protected by letters patent of the United States of America, is:

1. A motorized multi-position recliner chair mechanism, comprising:

a base rail;

a footrest support bracket for supporting a footrest;

a seatback support bracket for supporting a seatback;

a seat rail for supporting a seat of said chair;

a rear motor mounting tube;

a drive motor pivotally mounted upon said rear motor mounting tube around a first pivot pin;

a drive motor actuator operatively connected to said drive motor;

an actuator drive block operatively connected to said drive motor actuator;

first linkage operatively connected to said actuator drive block for controlling movement of said footrest support bracket when said actuator drive block is moved in a first direction a first predetermined amount along said drive motor actuator by said drive motor; and

second linkage operatively connected to said actuator drive block for controlling movement of said seatback support bracket when said actuator drive block is moved in said first direction a second predetermined amount along said drive motor actuator by said drive motor;

wherein said rear motor mounting tube is pivotally connected to said base rail around a second pivot pin which is disposed in a coaxial manner with respect to said first pivot pin which pivotally mounts said motor drive upon said rear motor mounting tube such that said drive motor is substantially fixed, or at least positionally constrained, at a predetermined position with respect to said base rail, thereby providing enhanced stability to said chair wherein no asymmetrical moments are developed by and transferred to said base rail as said drive motor under-goes pivotal movements.

2. The mechanism as set forth in claim **1**, wherein:

wherein said actuator drive block is pivotally connected to a front actuator drive block mounting tube.

3. The mechanism as set forth in claim **2**, wherein:

said first linkage comprises a plurality of footrest actuating links.

4. The mechanism as set forth in claim **3**, wherein:

a first drive control link directly connects said front actuator drive block mounting tube to one of said plurality of footrest actuating links such that as said actuator drive block is moved forwardly along said drive motor actuator, said plurality of footrest actuating links will move said footrest support bracket from a closed position to an open position.

5. The mechanism as set forth in claim **4**, wherein:

said plurality of footrest actuating links comprises four footrest actuating links.

6. The mechanism as set forth in claim **4**, wherein:

said front actuator drive block mounting tube is pivotally connected to said seat rail such that as said actuator drive block is moved forwardly along said drive motor actuator, said seat rail is likewise moved forwardly.

7. The mechanism as set forth in claim 2, wherein:

a front support link is connected at one end portion thereof to said second linkage and is connected at a second opposite end portion thereof to said base rail.

8. The mechanism as set forth in claim 7, wherein:

said second linkage comprises a recline control link which is connected at one end portion thereof to said front support link while a second end portion thereof is connected to said seat rail.

9. The mechanism as set forth in claim 8, wherein:

said second linkage further comprises a pivot link which is operatively connected at a first end portion thereof to said actuator drive block mounting tube and is operatively connected at a second end portion thereof to a first end portion of a second drive control link.

10. The mechanism as set forth in claim 9, wherein:

a second end portion of said second drive control link is operatively connected to said front support link.

11. The mechanism as set forth in claim 8, wherein:

a recline connector link has a first end portion thereof operatively connected to said recline control link and a second opposite end portion thereof operatively connected to a recline pivot link.

12. The mechanism as set forth in claim 11, wherein:

a rear support link has a first end portion thereof operatively connected to said base rail and a second end portion thereof operatively connected to said recline pivot link.

13. The mechanism as set forth in claim 12, further comprising:

a seatback recline link having one end portion thereof operatively connected to said seatback mounting bracket and a second opposite end portion thereof operatively connected to said recline pivot link such that when said recline pivot link is pivoted/rotated, said seatback recline link will cause said seatback to be moved from an upright position to a reclined position.

14. A motorized multi-position recliner chair mechanism, comprising:

a rear base rail;

a footrest support bracket for supporting a footrest;

a seatback support bracket for supporting a seatback;

a seat rail for supporting a seat of said chair;

a drive motor operatively connected to said rear base rail such that said drive motor is substantially fixed, or at least positionally constrained, at a predetermined position with respect to said rear base rail thereby providing enhanced stability to said chair wherein no asymmetrical moments are developed by and transferred to said base rail as said drive motor undergoes pivotal movements;

a drive motor actuator operatively connected to said drive motor;

an actuator drive block operatively connected to said drive motor actuator, wherein said actuator drive block is pivotally connected to a front actuator drive block mounting tube;

first linkage, comprising a plurality of footrest actuating links, operatively connected to said actuator drive block for controlling the movement of said footrest support bracket when said actuator drive block is moved along said drive motor actuator by said drive motor; and

second linkage operatively connected to said actuator drive block for controlling the movement of said seatback support bracket when said actuator drive block is moved along said drive motor actuator by said drive motor; and

wherein said first linkage comprises a first drive control link which directly connects said front actuator drive block mounting tube to one of said plurality of footrest actuating links such that as said actuator drive block is moved forwardly along said drive motor actuator, said plurality of footrest actuating links will move said footrest support bracket from a closed position to an open position.

15. The mechanism as set forth in claim 14, wherein:

said front actuator drive block mounting tube is pivotally connected to said seat rail such that as said actuator drive block is moved forwardly along said drive motor actuator, said seat rail is likewise moved forwardly.

16. The mechanism as set forth in claim 14, wherein:

a front support link is connected at one end portion thereof to said second linkage and is connected at a second opposite end portion thereof to said base rail.

17. The mechanism as set forth in claim 16, wherein:

said second linkage comprises a recline control link which is connected at one end portion thereof to said front support link while a second end portion thereof is connected to said seat rail.

18. The mechanism as set forth in claim 17, wherein:

said second linkage further comprises a pivot link which is operatively connected at a first end portion thereof to said actuator drive block mounting tube and is operatively connected at a second end portion thereof to a first end portion of a second drive control link.

19. The mechanism as set forth in claim 18, wherein:

a second end portion of said second drive control link is operatively connected to said front support link.

20. The mechanism as set forth in claim 14, wherein:

said plurality of footrest actuating links comprises four footrest actuating links.

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